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THE SIGNIFICANCE OF CERTAIN PHASES IN THE
GENUS *HELMINTHOPHILA*.

BY SPENCER TROTTER, M. D.

THE Mniotiltine genus *Helminthophila* has of late years presented some very interesting and curious features in the relations of certain of its species to one another and to several remarkable forms which have come to light in the past decade. In fact, in its earlier known history as a genus two forms appeared, one of which has only lately turned up again within our limits, while the other, if indeed it belonged with the genus, has long been relegated to the list of 'lost' or 'doubtful' species, a veritable myth, never having been seen since its first discovery, so that the genus has always figured in a rather eccentric light.

The group is highly characteristic of the Nearctic Region, consisting of eight well defined species, which pass under the general name of Swamp Warblers. Nowhere what might be called abundant birds, the *Helminthophilæ* still enjoy an extensive range over the continent, and are essentially migratory, as the insect nature of their food demands. The species fall into two subgroups, as regards their general form and pattern of color, and this corresponds pretty closely with the extent of their distribution.

Celata, *ruficapilla*, *peregrina*, *luciæ*, and *virginia* form one section, small birds of a more or less uniform and quiet coloration, the two former being the most widely distributed species of the genus.

The Orange-crowned Warbler, *celata*, with its western variety *lutescens*, ranges over the entire continent from ocean to ocean, but is comparatively rare in the Eastern Province, being seldom met with. It winters southward, beyond United States limits into Mexico, and reaches high latitudes in the Northwest. The Nashville Warbler, *ruficapilla*, on the other hand, with as wide a range as *celata*, is far more abundant in the Eastern Province than in the West, and extends its migrations northward to the Arctic Basin on the east. The Tennessee Warbler, *peregrina*, is chiefly eastern in its distribution, breeding northward into high latitudes.

Virginiae and *luciae* are restricted in their ranges, being characteristic of the Colorado Valley and Southern Rocky Mountain region.

The other section comprises *bachmani*, *chrysoptera*, *pinus*, and their curious allies, *lawrencei* and *leucobronchialis*; birds of striking coloration and of much more restricted ranges than the three plainer colored species of the former sub-group. *Bachmani* is exceedingly rare, having been taken but a few times in the Southern States. The Blue Golden-winged Warbler, *chrysoptera*, and the Blue-winged Yellow Warbler, *pinus*, are exclusively birds of the Eastern Province, the former ranging into Canada, though rarer in the Northern States, the latter scarcely if ever going beyond Massachusetts and Minnesota. Both winter south of our limits.

I have taken the liberty of thus hastily reviewing the genus for the purpose of bringing together as nearly as possible our present knowledge of the distribution of the several species. The history of the two forms *lawrencei* and *leucobronchialis* is already so well known to ornithologists that it need not be reiterated here, except to recall the very general belief of their hybrid nature.

The question naturally arises in the minds of most persons who have given any thought to the subject, What does the occurrence of such peculiar forms, taken in conjunction with other facts, signify? We are stepping into a somewhat uncertain region when we attempt to speculate on a subject of this character, but I believe that the only way in which we may hope to throw any light whatever upon such a subject is from an evolutionary standpoint.

The rise and decay of genera and species in the struggle for existence; the pressure of dominant groups upon smaller and less adapted races; action and reaction through environment;—these are the factors involved, and that have given rise to many apparently inexplicable phenomena.

A dominant group is characterized by the abundance of its forms, both in species and individuals, over wide areas, this being the index of its vigor and consequent ability to maintain itself against competitors, and its adaptability to varying conditions of environment. Rarity in species and individuals is indicative of degeneracy, the expression of the inability of the group to hold its own.

Hybridism under nature is a further expression of decay, the result of a growing rarity in the individuals of a species.

Of course a hybrid may be purely accidental, as I believe the case to have been with the cross between the Barn and the Cliff Swallow which I described some years ago, the result of a *mesalliance* between two individuals during the spring flights when numbers of both species are 'hawking' in the air together prior to nesting. But when we see crossing repeatedly performed the question of accident must be set aside and another means of solution sought.

Let us see how these principles will apply to the genus *Helminthophila*. Here we have a group of eight species, as has been cited above, none of which are as a rule very abundant, especially when compared with other birds, *e. g.*, certain species of *Dendroica*.

Recalling the distribution of the species, we find that each has a more or less definite area, but their habitats considerably overlap one another. That of the two sub-divisions noted, *celata*, *ruficapilla*, and *peregrina* are the most widely distributed, while *chrysoptera*, *pinus*, and their allies are much more restricted, and it is in this latter section that we find what is to my mind an evidence of decay. Strictly insectivorous, the *Helminthophilæ* have come in direct competition with other insectivorous forms, and among them the closely allied and dominant genus *Dendroica*, with its thirty odd well defined species, whose habits and nature closely resemble the Swamp Warblers in many ways. The pressure exerted by *Dendroica* would be very much greater in the East than in the West, owing to the greater preponderance of individuals and species in the former area; consequently the more restricted eastern species of *Helminthophila* would feel this competition keenly.

Many of the *Dendroicæ* pursue and capture their food in much the same manner as the *Helminthophilæ*, and in similar localities; more than this, the majority are expert fly-catchers, taking mature insects on the wing with much greater readiness and persistency than do the species of Swamp Warblers. A glance at the bills of the two will show which is the best adapted for diversified work.

And what has been the upshot of all this? Simply that these restricted species of *Helminthophila* are succumbing to more wide-spread and better adapted forms, and their decrease in num-

bers, though not directly apparent in all the species, is expressed by the curious phenomena which have lately come under our notice. *Bachmani* is exceedingly rare, for aught we know on the verge of extinction, though it still exists in favorable localities in the vast swamps of the Southern States.

The mythical *carbonata* might have been the last of another form,—who can tell? Audubon gave it a place in this genus.

Chrysoptera and *pinus* yet remain fairly abundant but forced apparently to cross with each other, and the resulting forms, *lawrencei* and *leucobronchialis*, without doubt recross with the parent species.* Further, we find evidence that *pinus* has undoubtedly gone over to the strange genus *Oporornis* and contracted an alliance there.†

These are the facts, and we are left to draw our own conclusions in the best way possible. Genera and species rise up, increase and become dominant only to break down again under the pressure of other and better adapted forms. What the other genera of the Mniotiltidæ may have been in the past we can only surmise.

Those that now possess but one or two species may, and very likely have, possessed more and been dominant in their time. A change in habit under pressure and consequent structural modification would be of immense advantage, and finally result in one or two well adapted species forming a well defined genus. Such may have been the history of *Mniotilta*, *Protonotaria*, and others, and such may be the future of these *Helminthophilæ* who now, as it seems to me, show unmistakable evidence of break-down after a long and severe struggle against better adapted forms.

This or ultimate extinction are the only alternatives.

* Brewster, Wm. Bull. Nutt. Ornith. Club, Vol. VI, Oct. 1881, p. 218.

† Langdon, Frank W. Bull. Nutt. Ornith. Club, Vol V, Oct. 1880, p. 208, plate, iv.